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BRAZILIAN COCKROACHES FOUND IN BIRDS' NESTS, WITH  
DESCRIPTIONS OF NEW GENERA AND SPECIES

(DICTYOPTERA: BLATTARIA: BLABERIDAE AND BLATTELLIDAE)

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ABSTRACT—The following species of cockroaches were collected in pendulous birds' nests in the Amazon: *Alphelixia sicca*, n. gen., n. comb., *Schultesia lampyridiformis*, n. gen., n. sp., *Amazonina nidicteridicola*, n. sp., *Chorisoneura* (2 undetermined species), *Chorisoneura inversa*, *Dendroblatta cnephaia*, and *Lophoblatta arlei*. More than 1 species of cockroach may be found in the same nest. The nest habitat is undoubtedly a normal one for most of these cockroaches which probably act as scavengers.

There are very few records of cockroaches taken from the nests of birds. *Euthlastoblatta facies* (Walker) (= *Aglaopteryx facies* (Walker)) lives in large numbers among twigs in the nests of the grey Kingbird in Puerto Rico (Danforth in Wolcott, 1950). Immature cockroaches were commonly found in the nests of Ploceinae in Madagascar and Ivory Coast. All nests of *Foudia* spp. examined in Madagascar contained many cockroaches, and Paulian (1950) believed that the blattids were species peculiar to the nests of birds. In the Ivory Coast, Delamare Deboutteville and Paulian (1952) found a few cockroaches in nests of *Ploceus* sp., and *Estrildine* sp. *Griffiniella heterogamia* Karny (= *Ploceophilus kohlsi* Rehn, in Princis, 1971) live, probably as scavengers, in the communal nests of the Social Weaver Bird (*Philetairus socius*) in Southwest Africa (Rehn, 1965).

During the 1967 Alpha Helix expedition to the Amazon, I collected about 10 species of cockroaches in the pendulous nests (fig. 105) of an icterid (probably the oriole, *Cassicus persicus* (Linn.)). Most of the nests apparently were abandoned and a few had the remains of dead young birds. The cockroaches probably are scavengers and may have inhabited the nests while the birds occupied them. This paper reports on the cockroaches collected in the nests. The insects were cultured and the descriptions of the new genera and species are based on reared material.

*Alphelixia*, n. gen.<sup>1</sup>

Type-species: *Ischnoptera* (?) *sicca* Walker (present designation)

Generic Description: Sexes markedly dissimilar. Male tegmina and wings normally developed, lacking in ♀.<sup>2</sup> Legs short, femoral armament as follows (12 specimens): small stout spines on ventral margins of front femora bimarginally serrated (fig. 16). Ventral anterior margin of front femur (♂) basally with a row of 4 to 8 (average 6) short, broad, tapering spines followed by a row of small piliform setae, usually terminated by a short spine (fig. 15); a few piliform setae may precede the proximal spines, and sometimes may occur between two spines; ventral posterior margin with 1 or 2 small stout spines (rarely none), 1 of these usually distad. Ventral front margin of mid femur with 2 spines (rarely 3); ventral hind margin with 3 spines (rarely 2 or 4). Ventral anterior margin of hind femur with 2 spines; ventral hind margin with 3 spines (rarely 4). Distal spines absent from both ventral margins of the mid and hind femora. Spines on female femora usually smaller, fewer in number than in the male, and tend to be atrophied. Female caudal metatarsus much smaller, and in male slightly smaller than succeeding tarsal segments. Ventral margins of all metatarsi unarmed except for a few piliform setae. Pulvilli well developed, arolia very large. Tarsal claws equal, in ♂ microscopically serrulate (teeth truncate) (fig. 17), in ♀ simple (fig. 18). Subgenital plate (♂) slightly asymmetrical, subtrigonal, apex rounded (fig. 6). Male genitalia lacking dorsal sclerite of the second left phallomere (fig. 19).

The marked differences of the sexes of *Alphelixia* (Blaberidae, Epilamprinae) are similar to those found in *Hyporhcnoda* Hebard, and the femoral armament (including atrophy of the female spines) also resembles that genus. However, both sexes of *Alphelixia* have well developed arolia and the metatarsi are unarmed ventrally whereas in *Hyporhcnoda* the arolia are small in males, subobsolete or absent in females, and the caudal metatarsi have 2 rows of ventral spines. The male genitalia of these 2 genera also differ markedly; *Hyporhcnoda* has internal genital structures more typical of Blaberinae (Roth, 1970a).

*Alphelixia sicca* (Walker), n. comb.

figs. 1-24

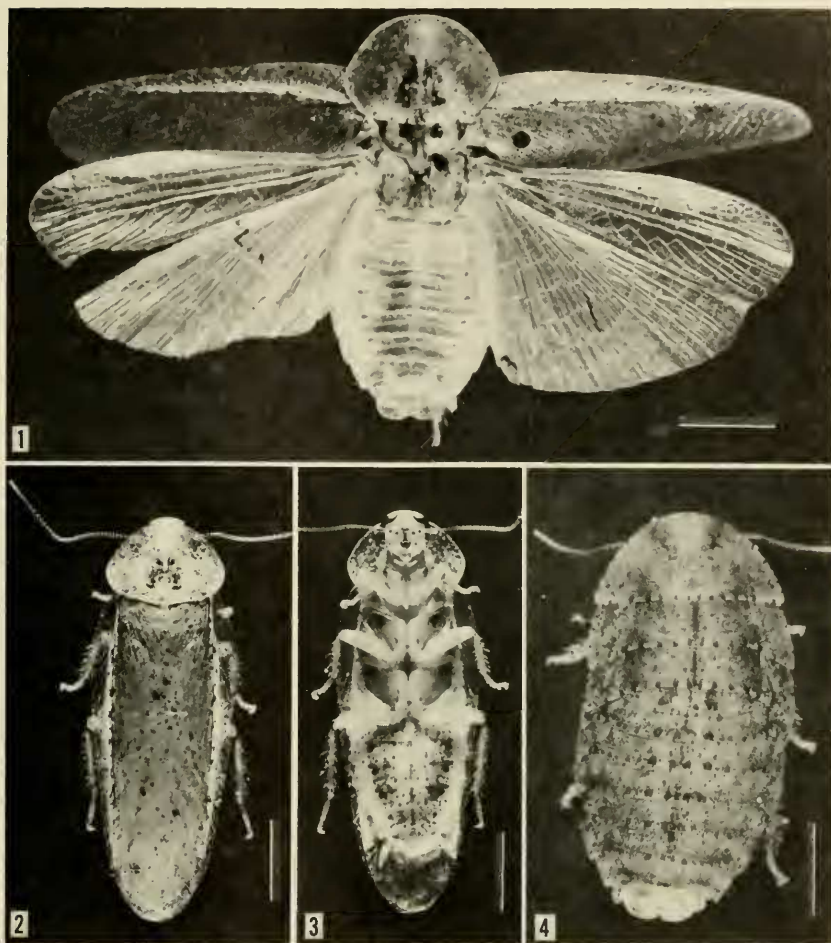
Syn. *Ischnoptera* (?) *sicca* Walker (Walker, 1869: 149, ♂ not ♀ as indicated).

*Pinaconota sicca* (Walker) (Cohen and Roth, 1970: 1524)

The male of this species (figs. 2-3) was found to be conspecific with the holotype male of *Ischnoptera* (?) *sicca* Walker (fig. 1).

<sup>1</sup> The genus is named after the Research Vessel Alpha Helix, of the Scripps Institution of Oceanography.

<sup>2</sup> For descriptive purposes I consider the female as lacking tegmina and wings. However, Lefeuve (1971) has found from studies of the tracheae that subapterous species (e.g. *Hyporhcnoda* ♀) have wing pads which remain "nymphal" in the adult.



Figs. 1-4. Adults of *Alphelixia sicca*. 1. Male. Holotype of *Ischnoptera* (?) *sicca* Walker. 2-4. Brazilian specimens (reared) collected in a bird's nest. 2. Male (dorsal). 3. Male (ventral). 4. Female. (scale = 3 mm).

I have examined a female of *Pinaconota bifasciata* (Saussure) (det. by Rehn and confirmed by K. Princis) in the Museum of Comparative Zoology. Kirby (1904:113) misidentified the species and erred in synonymizing Walker's *Ischnoptera sicca* with *Pinaconota bifasciata*. Not only do the external characters differ markedly between these 2 species but the genitalia of *Pinaconota* sp. and *A. sicca* clearly indicate different genera (Roth, 1971a). Both sexes of *Pinaconota* also have well developed tegmina and wings (Shelford, 1910:2), structures absent in female *Alphelixia*. Cohen and Roth (1970)

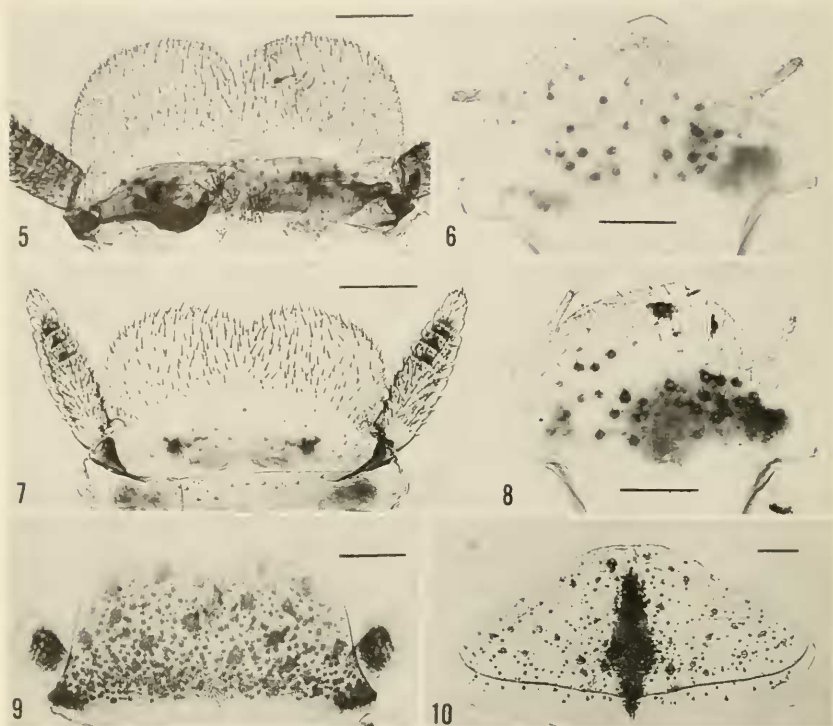
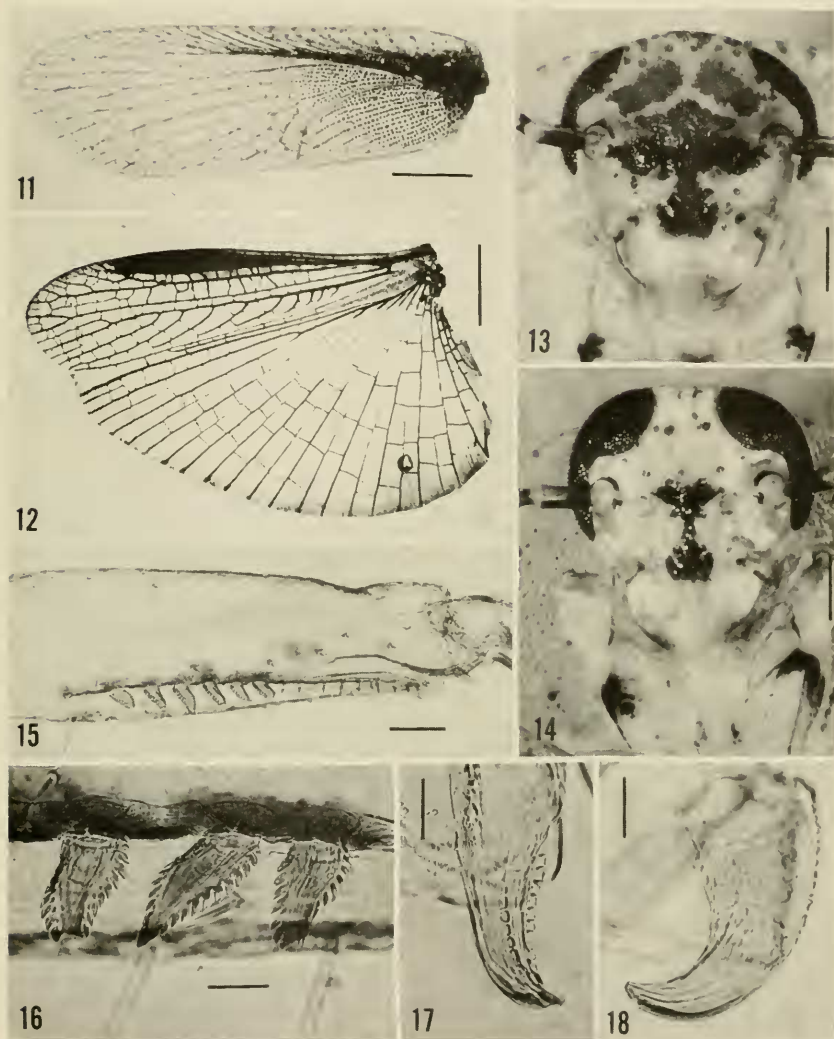


Fig. 5-10. *Alphetixia sicca*. Supra-anal plates (left; dorsal) and subgenital plates (right; ventral). 5-6. Holotype ♂ of *Ischnoptera* (?) *sicca* Walker (From specimen shown in Fig. 1). 7-10. Reared Brazilian specimens. 7-8. Male. 9-10. Female. (KOH, cleared flattened preparations; scale = 0.5 mm).

used the name *Pinaconota sicca* realizing that the species was not *bifasciata*, but they assumed that Kirby had placed the species in the correct genus.

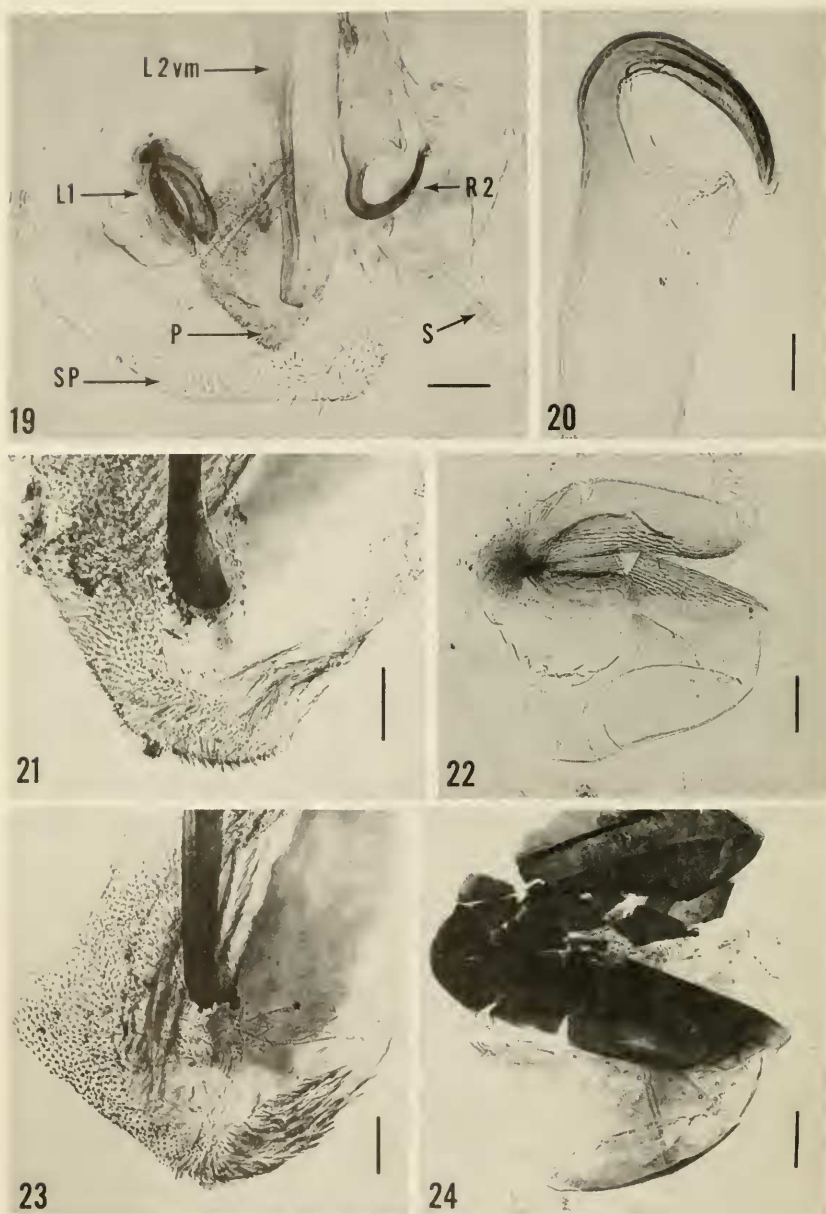
Male: Head reaching to about or slightly beyond edge of weakly arched front margin of pronotum (fig. 2). Interspace between eyes wide but subequal to interspace between antennal sockets (fig. 14). Wings and tegmina extend well beyond tip of abdomen (fig. 3). Tegmen and wing venation as shown in figures 11 and 12. Tergal glands absent. Legs as in generic description. Subgenital plate (figs. 6, 8) slightly asymmetrical, roughly trigonal, apex rounded. Styli slender, elongated. Supra-anal plate (figs. 5, 7) spiculate, hind border deeply emarginate. Cerci extend beyond hind margin of supra-anal plate (fig. 7). Internal genitalia (fig. 19): Apex of L2vm unmodified; L2d absent; preputial membrane spiculate (figs. 21, 23); margins of cleft of L1 broadly sclerotized (figs. 22, 24); apex of R2 with a membranous extension, the membranous base of hook (R2) broadened, its outer margin rounded (fig. 20).





Figs. 11-18. *Alphilixia sicca*. 11-12. Left tegmen and wing ( $\delta$ ). 13. Head ( $\eta$ ). 14. Head ( $\delta$ ). 15. Prothoracic femur ( $\delta$ ). Ventrocephalic margin. 16. Spines on ventrocephalic margin of front femur ( $\delta$ ). 17. Tarsal claw ( $\delta$ ). 18. Tarsal claw ( $\eta$ ). (Figs. 15-18 KOH preparations; scale, figs. 11-12 = 2 mm, figs. 13-14 = 0.5 mm, fig. 15 = 0.2 mm, figs. 16-18 = 0.05 mm).

Coloration: Pale, cinereous, with fusco-rufous and white markings. Head: Several small reddish brown spots between eyes. A median longitudinal band about as wide as interspace between eyes, and 1 on base of clypeus, both connected by vertical narrower band (fig. 14). Pronotum: Pellucid with reddish brown Rorschach ink blotlike figure medially (fig. 2). Small dark spots widely



Figs. 19-24. Male genitalia of *Alphetixia sicca*. 19. Genital structures and subgenital plate (dorsal). L1 = first sclerite of left phallomere; L2vm = median sclerite of left phallomere; P = prepuce; R2 = hooked sclerite of right phallomere; S = style; SP = subgenital plate. 20-22. R2, prepuce and apex of L2vm, and L1 respectively, of a reared specimen. 23-24. Prepuce and apex of

spaced around pronotal margin. Minute fusco-rufous dots over surface except near lateral and anterior margins. Latero-posterior margins white. Tegmen pellucid with broad white line at base between subcosta and radius, tapering posteriorly (this line may appear longer than it actually is because an underlying white area between the costal veins of the hind wing shows through the transparent tegmen). Punctate-striate basally along and/or between veins, fusco-rufous dots sparse along posterior parts of anal veins (fig. 11). A few large and small irregularly shaped spots distributed over surface (not seen in fig. 11). Hind wing with spaces between costal branches, thickened, whitish (fig. 12).

Measurements (mm; 5 males, alcoholic specimens): Overall length (including folded tegmina) 14.5–15.0; pronotum length 3.0–3.2, width, 4.2–4.5; tegmen length 12.1–12.5; widest width (both tegmina) 5.2–5.7; abdomen length 6.0–7.4; length of caudal femur 2.2–2.4. The reared males are somewhat smaller than the holotype ♂.

The male accessory sex glands have 3 or 4 uricose tubules. In the Blaberidae, uricose glands have, so far, only been found in the Epilamprinae (Roth, 1967).

Female: Completely lacking tegmina and wings (fig. 4). Head hidden under arched pronotum. Interocular space wider than in male, about equal to interspace between antennal sockets (fig. 13). Leg armament (6 specimens): ventral anterior margin of front femur with 1 to 6 spines (average 3) followed by a row of piliform setae, usually terminated by distal spine; ventral hind margin without, or with 1 spine. Ventral anterior margin of mid femur with 2 (rarely 1) spines, hind margin with 0 to 2 spines. Ventral anterior margin of hind femur with 2 (rarely 1 or 3) very small spines; three somewhat larger spines on hind margin. Generally, the femoral spines on mid and hind femora are greatly reduced. Supra-anal plate with sides slightly tapering, broadly rounded with medial indentation; cerci broad, short, not reaching beyond posterior margin of supra-anal plate (fig. 9). Subgenital plate broadly convex posteriorly, slightly sinuate laterally (fig. 10).

Coloration: Light tan, densely mottled with light reddish brown spots. Frons with 3 large markings separated by thin clear lines which form an inverted Y; the 2 lateral markings between eyes reddish. Broad longitudinal band about equal in width to distance between antennal sockets; upper half reddish, lower half darker (these 2 areas sometimes "separated" by longitudinal impression); narrow connecting dark band extends downwards medially and expands slightly on clypeus (fig. 13). (Small ♀ nymphs have the same facial markings as the adult ♀). Large spots uniformly spaced around outer margins of pro-, meso-, and metanotum. Posterior margins of thoracic and abdominal segments appear beaded (fig. 4) with large dots that are bicolored, i.e. dark reddish brown posteriorly and lighter anteriorly. Under-surface pale with widely spaced reddish brown spots. Median band on penultimate segment broadens noticeably on subgenital plate (fig. 10). Legs pale, outer corner of front coxa with large reddish brown spot and large irregular shaped spots on dorsal anterior surface of mid coxa. Small dark dots surround bases of minute setae on mid and hind femora.

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L2vm, and L1 of holotype ♂ of *Ischnoptera* (?) *sicca* Walker (from specimen shown in Fig. 1). (KOH preparations; scale, fig. 19 = 0.25 mm, figs. 20–24 = 0.1 mm).

Measurements (mm.; 5 females, alcoholic specimens): Total length 11.5–12.5; pronotum length 3.0–3.7, width 5.0–5.5; abdomen length 6.2–6.8; caudal femur length 2.1–2.4.

The chromosomes of *A. sicca* number 33 (♂) and 34 (♀), and are mostly submetacentric with some metacentric (reported as *Pinaconota sicca* (Walker), Table 1 and fig. 95 in Cohen and Roth, 1970).

Holotype Male: *Ischnoptera* (?) *sicca* Walker. British Museum (Natural History).

Allotype Female: Near Serra Tamendaui, Rio Negro, Amazonas, Brazil (64° 45' W 0° 27' S). Coll. L. M. Roth. Academy of Natural Sciences, Philadelphia. Reared males, paratype females, and nymphs deposited as follows: 1 ♀, 4 ♂, 2 nymphs, Academy of Natural Sciences, Philadelphia; 2 ♀, 4 ♂, U. S. National Museum, Washington, D. C.; 1 ♀, 3 ♂, Zoological Institute, Lund, Sweden; 1 ♀, 2 ♂, British Museum (Natural History).

The original material of *Alphelixia sicca* was collected in 2 nests, July 18, 19, 1967, along the shore of the Rio Negro, near Serra Tamendaui. The nests were hanging from a tree, about 10 feet above the water surface. Nest number 1 yielded 1 adult ♂ and 17 nymphs; nest 2 had 15 nymphs. *Lophoblatta arlei* Albuquerque (1 ♂, 1 ♀; nest No. 1) and *Amazonina nidicteridicola* n. sp. in both nests were also found with *Alphelixia*. The large number of nymphs of the ovoviviparous *Alphelixia* collected indicates that the bird nests are probably a normal habitat for this species.

*Lophoblatta arlei* is unusual in that it, and the related *Lophoblatta brevis* Rehn, are the only known members of the Plectopterinae which carry their non-rotated oöthecae externally until the eggs hatch (Roth, 1968). The oötheca of *L. arlei* is unusual in shape being wider than high and the dorsal and ventral surfaces are flattened (fig. 104).

*Schultesia*, n. gen.<sup>3</sup>

Type-species: *Schultesia lampyridiformis*, n. sp.

The male genitalia of this ovoviviparous genus (Blaberidae) places it in the Zetoborinae (Phortioecini) but its nondeplanate form and marked resemblance to adult winged fireflies separate it from other genera of this subfamily (and tribe) (Roth, 1970) most of which are larger and markedly deplanate. *Achroblatta luteola* (Blanchard) also resembles certain species of Lampyridae (Hebard, 1921a). However, *Achroblatta* is a member of the Panchlorinae whose male genitalia (Roth, 1971b) differ markedly from the Zetoborinae (Roth, 1970).

<sup>3</sup>The genus is named in honor of the Botanist, Dr. Richard Schultes, Harvard University, a member of the Alpha Helix expedition, who spent many years collecting in the Amazon.

Generic Description: Sexes similar. Form not deplanate. Tegmina and wings equally developed, covering abdomen. Head not hidden under pronotum. Occipital space between eyes about equal to interspace between antennal sockets. Pronotum subelliptical, arched anteriorly, caudal margin straight. Wings dusky, median vein concave basally. Ventral anterior margin of front femur with row of almost uniform piliform setae terminated by large distal spine. Tarsal segments without heavy spines on ventral margins. Caudal metatarsus about equal in length to succeeding segments. Pulvilli large, covering entire or almost entire (metatarsus) ventral surfaces of tarsal segments. Arolia well developed. Tarsal claws equal, minutely serrulate. Male tergite 1 modified. Caudolateral angles of eighth tergite roundly produced. Supra-anal plate medially invaginated. Subgenital plate ( $\delta$ ) asymmetrical, indented on right, styli subequal.

*Schultesia lampyridiformis*, n. sp.<sup>4</sup>

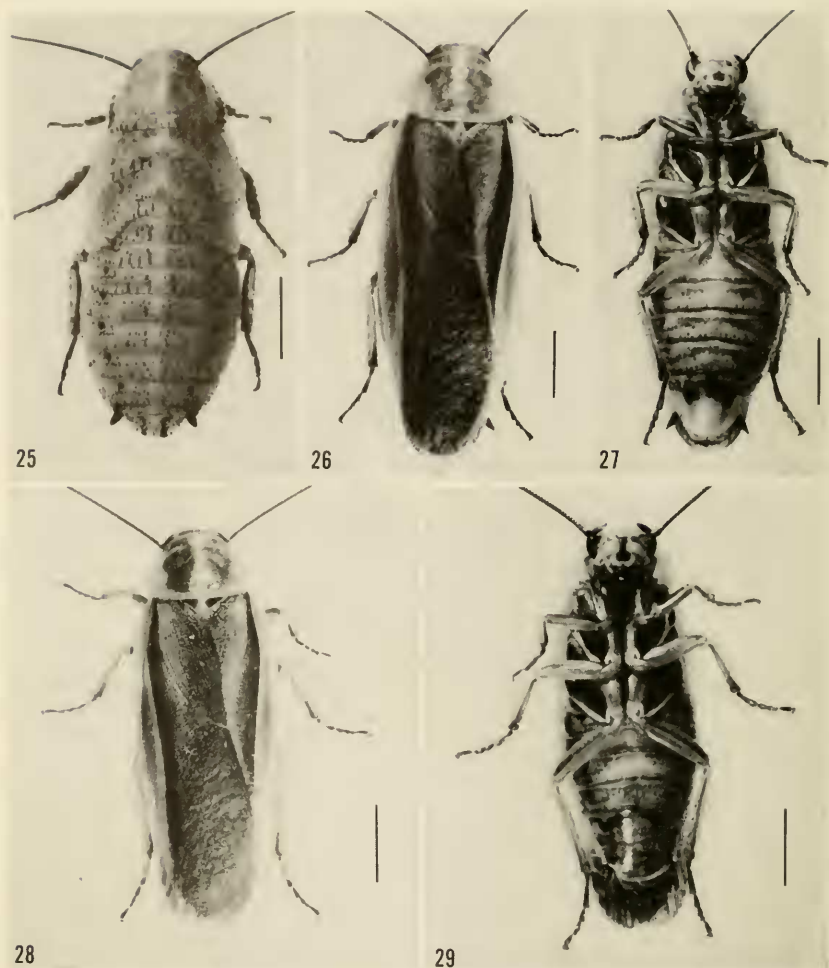
figs. 25-43

Male: Head exposed beyond anterior pronotal margin (fig. 28). Eyes wide apart, interspace between them about equal to interspace between antennal sockets (fig. 30). Pronotum with anterior margin arched, subelliptical, widest portion below middle; hind margin straight. Wings and tegmina of equal length extending slightly beyond end of abdomen (fig. 29). Costal veins of wing indistinct, area between them slightly thickened. Median vein concave. Second plical vein short, joining first plical about  $\frac{1}{3}$  the distance from its base (fig. 39). First abdominal tergite with pale median vertical ridge with lateral elevations arising anteriorly and extending obliquely downward (transparent in living specimen) (fig. 37). Somewhat similar but sclerotized elevations decreasing in width caudally on segments 2 to 6 (subobsolete on segment 6). Narrow medial ridge extends from first to sixth tergite where the line is continued to supra-anal plate as a slightly broader pale marking. Caudolateral angles of eighth tergite roundly produced posteriorly (fig. 32). Supra-anal plate spicular, medially indented; cerci relatively short, not extending much beyond free margin of supra-anal plate (fig. 34). Subgenital plate densely setose and spicular, asymmetrical, broadly convex, margin near right style indented (best seen when plate is flattened); styli slender, elongate, right slightly larger than left (fig. 35). Ventral anterior margin of front femur with row of piliform setae almost uniform in length (distal setae closer together and may be slightly smaller than basal setae) terminated by large distal spine; ventral hind margin with distal spine smaller than one on opposite margin (fig. 36). Mid femur with large distal spine on ventral anterior and hind margins. Ventral anterior margin of hind femur with 1 large distal spine; ventral hind margin without or with 1 large spine about  $\frac{1}{3}$  distance from apex. A few piliform setae also present on ventral margins of mid and hind femora. One geniculate spine on mid and hind femora only. Other leg characters as in generic description. Internal male genitalia (fig. 40): Enlarged L2d extends dorsally (fig. 42), L1 (fig. 41), and R2 with subapical incision (fig. 43), all characteristic of Zetoborinae.

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<sup>4</sup> Because of its resemblance to fireflies, the species is named after the beetle family Lampyridae.



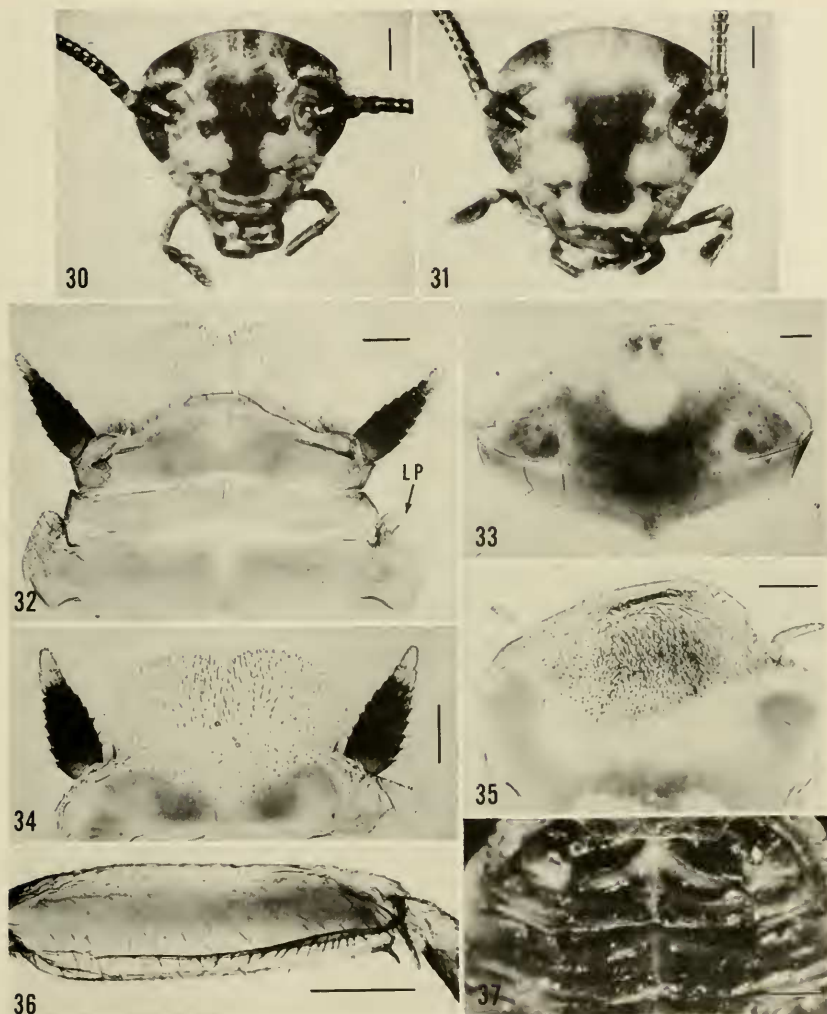


Figs. 25-29. *Schultesia lampyridiformis*. 25. Nymph. 26-27. Adult (♀). 28-29. Adult (♂). (scale = 3 mm).

Measurements (mm; 3 males): Total length (including folded tegmina) 15.4-15.7, pronotum length 2.9-3.0, width 4.1-4.5; tegmen length 12.8-13.2, width 3.6-4.0 (widest combined width 5.5-5.8); abdomen length 8.7-9.4.

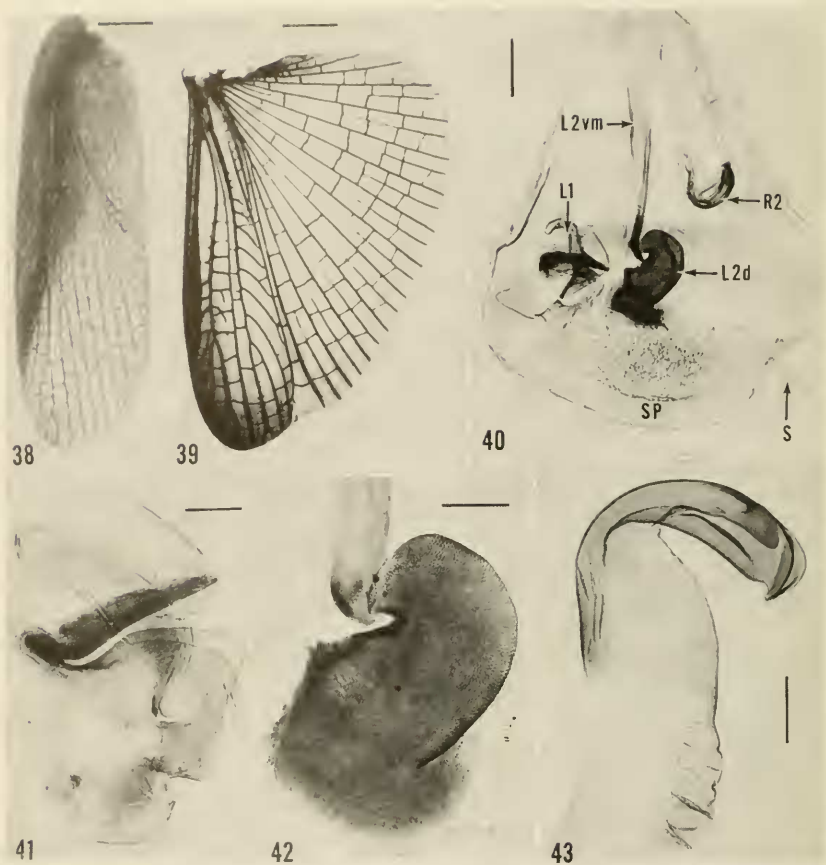
Female: Similar to male (figs. 26, 27, 31, 32) except for following: Elevations on abdominal tergites lacking. Subgenital plate symmetrical, subtrigonal, apex round with a shallow median invagination (best seen in flattened preparation) (fig. 33).

Measurements (mm; 3 females): Total length (including folded tegmina) 17.8-20, pronotum length 3.3-3.4, width 4.5-5.1; tegmen length 14.5-15.3, width 4.2-4.4 (widest combined width 6.6-7.6); abdomen length 8.5-9.3.



Figs. 30-37. *Schultesia lampyridiformis*. 30. Head ( $\delta$ ). 31. Head ( $\varphi$ ). 32. Supra-anal plate and tergites 8 and 9 ( $\varphi$ ; dorsal). LP = laterocaudal projection on segment 8. 33. Subgenital plate ( $\varphi$ ; ventral). 34. Supra-anal plate ( $\delta$ ; dorsal). 35. Subgenital plate ( $\delta$ ; ventral). 36. Front femur ( $\delta$ ; ventrocephalic margin). 37. First and second abdominal tergites ( $\delta$ ). (figs. 32-36 from KOH preparations, scale = 0.5 mm).

Coloration: ( $\delta$  and  $\varphi$ ).—Head buffy brown (Ridgway, 1912, pl. XL) with broad median clove brown band between antennal sockets extending downward to clypeus (figs. 30, 31). Vertex dark with a few very light lines. Antennae and palps dark. Pronotum olive buff with 2 broad, laterally concave, olive brown markings separated by pale median line (figs. 26, 28). Tegmina



Figs. 38-43. *Schultesia lampyridiformis*. 38-39. Left tegmen and wing (♀). 40. Male genitalia and subgenital plate (dorsal). L2d = dorsal sclerite of left phallomere; other abbreviations as in fig. 19. 41-43. Male genitalia. 41. L1. 42. Apex of L2vm, and L2d. 43. R2. (Figs. 40-43 from KOH preparations; scale, figs. 38-39 = 2 mm, fig. 40 = 0.5 mm, figs. 41-43 = 0.2 mm).

olive brown with broad olive buff marking in area bounded by radius and costa; below this pale area a somewhat sinuous dark band followed by paler region covering part of anal field; distal part of overlapping tegmina more intense brown (figs. 26, 28). Wings dusky, upper distal half darker than remainder (fig. 39); area between costal veins pale. Dorsal surface of abdomen dark brown with pale lateral margins; undersurface light brown but may have extensive dark areas. Posterior margin of subgenital plate pale (fig. 29). Cerci dark brown except for 2 pale terminal segments (figs. 32, 34). Coxae dark with pale margins. Femora, distal parts of tibiae, and tarsi dark, with parts of tibiae pale.

Male holotype, Female allotype: Adolpho Ducke Preserve, outside of Manaus, Brazil. Coll. L. M. Roth. Academy of Natural Sciences,

Philadelphia. Nymphs and adult paratypes (reared) deposited as follows: 3 ♂, 3 ♀, 3 nymphs, Academy of Natural Sciences, Philadelphia; 3 ♂, 3 ♀, 3 nymphs, U. S. National Museum; 1 ♂, 3 ♀, 2 nymphs, Zoological Institute, Lund, Sweden; 2 ♂, 2 ♀, 2 nymphs, British Museum (Natural History).

The chromosomes of *S. lampyridiformis* number 29 (♂) and 30 (♀), and are mostly submetacentrics and a few metacentrics (reported as an undetermined genus (41B), Table 1, in Cohen and Roth, 1970).

*Schultesia lampyridiformis* was first collected July 20, 1967, at Gaviaõ, Rio Negro, Amazonas (61° 46' W 1° 24' S) (near the expedition base camp). Seven nests were collected in 1 tree, much of which was under water about 50 yards from shore. An undetermined species of *Chorisoneura* was also found in these nests and the approximate numbers of both genera collected were as follows:

Nest Number	<i>Schultesia</i>		<i>Chorisoneura</i> sp. A.	
	Adults	Nymphs	Adults	Nymphs <sup>b</sup>
1 <sup>a</sup>	0	0	0	2
2	0	0	4	27
3 <sup>a</sup>	0	0	0	5
4	4♂, 8♀	29	2	13
5	0	1	4	6
6	4♂, 3♀	7	12	7
7	0	6	14	13

<sup>a</sup> Large ant colony in nest.

<sup>b</sup> Not all of the very small nymphs were counted.

The oöthecae of *Chorisoneura* sp. A. (fig. 99) were very numerous and attached to the straw of the nests. One specimen of *Amazonina nidictericicola* n. sp. (reared), and an undetermined blattellid (♀ reared) were also found in 1 of these nests.

Eight nests were collected July 21, 1967, at Moura, Rio Negro (61° 38' W 1° 28' S). Five ♂, 2 ♀, and 19 nymphs of *Schultesia* were found with 3 blattellid nymphs, 1 of which was reared and determined by Ashley Gurney as *Chorisoneura inversa* Hebard.

Several nests were collected about 60 feet from the ground near the Adolpho Ducke Preserve, outside of Manaus on August 1, 1967. Three species of cockroaches were found in these nests: *Schultesia lampyridiformis* (2 ♂, 3 ♀, 1 nymph); *Dendroblatta cnephaia* Hebard (fig. 91), 1 ♂, 1 ♀, 3 nymphs (an adult ♀ of this species was also collected by F. Kafatos, at black light in the Adolpho Ducke Preserve); *Chorisoneura* sp. B., several first instars and 2 oöthecae (which differ from the egg cases produced by *Chorisoneura* sp. A. (fig. 99) in

being pale with a dark uneven longitudinal band along the sides (fig. 98)).

A laboratory colony of *Schultesia* has been maintained on laboratory chow for the past 5 years. Newly emerged females attract and mate with males who court in the typical cockroach manner by raising the wings and exposing their tergites. The females respond sexually by palpating the male's dorsum prior to copulation. Like all Blaberidae (Roth, 1967a), *Schultesia* extrudes and retracts its oötheca into a uterus where the eggs develop. The oötheca consists of a thin transparent membrane surrounding the eggs (fig. 103). A habitus of the nymph is shown in figure 25. The large numbers of *Schultesia* and *Chorisoneura* (plus oöthecae) taken indicate that the bird nest habitat is undoubtedly a normal association for these genera.

Some characteristic features of *Dendroblatta cnephaia* (fig. 91) are illustrated in figures 92-97. The supra-anal plate has a slight mesal indentation, and the cerci are very long (fig. 92). A small sclerotized extension with large curved apical spines is found between the large lamellate styles (fig. 94). Normally this structure is closely adpressed into a curved depression of the inner face of the large right style. It is well hidden and difficult to see unless the subgenital plate is cleared and flattened. Hebard (1926) did not mention this distinctive structure in his original description. The ventral anterior margin of the front femur has a long row of small spines more or less uniform in length, terminated by 2 large distal spines (fig. 93). The internal genitalia are illustrated (figs. 95-97) for the first time. The L2d is large, bulbous, and separated from L2vm (fig. 95). The hook (R2) has a subapical incision (fig. 97). The oötheca has a distinctive, broad, dark, ventral, longitudinal band (fig. 100).

*D. cnephaia* has 31 (♂) and 32 (♀) chromosomes, almost all of which are submetacentric (Cohen and Roth, 1970).

*Dendroblatta cnephaia* was only recorded from French Guiana by Hebard (1926). Princis (1969) also listed it from Surinam, but he referred to Bruijning (1959) for this record; Bruijning did not report it from Surinam.

*Amazonina nidicteridicola*, n. sp.<sup>5</sup>

figs. 44-49, 52-54, 56-57, 62, 65, 66, 71, 80-82

This species agrees with the generic characters (Hebard, 1929) of minute scattered tegminal dots, armament of the ventral anterior margin of the front femur, wing venation, and specializations of the male and female subgenital plates.

<sup>5</sup> Named after the family (Icteridae) of birds that make pendulous nests in which this species of *Amazonina* is found (nidus = nest, Icteridae, cola = dweller).



Male: Ventral anterior margin of front femur with row of spines which decrease in size distad terminated by 2 long spines (fig. 52); ventral hind margin with 3 spines and 1 distal. Ventral anterior and hind margins of mid and hind femora well armed with large spines, widely spaced, each margin possessing a distal spine; piliform setae interspersed between large spines. Tarsal claws symmetrical, minutely serrulate. Pulvilli and arolia well developed. Tegmina with small darkened spots, each indicating the insertion of a fine seta. Spots on left tegmen occurring on many veins, but more numerous distally, those on right tegmen few in number occurring principally on costal veins, very few (basally) on cubital and medial veins. Costal veins of hind wing clubbed; cubital vein with 3 or 4 complete branches (fig. 54). Tergal glands absent. Supra-anal plate broadly but shallowly rounded (fig. 56). Subgenital plate with distal margin curved ventrad and small median nipplelike protuberance which may curve dorsad; shallowly convex laterally, each corner broadly rounded, thickened, curved ventrad, bearing apically a dense patch of stout spines, some directed ventrad, others caudad (fig. 66). Internal genitalia (figs. 80-82): L2d curved, pointed, fused to and a continuation of L2vm (fig. 80).

The extent of the ventral curvature of the lateral protuberance on the posterior margin of the subgenital plate is variable (6 paratypes), not at all occurring in some specimens.

Holotype measurements: (mm; measured as alcoholic specimen prior to being pinned): Total length (including folded tegmina) 14.3; pronotum length 2.5, width 3.2; tegmen length 12, width 3.1; abdomen length 6.5.

Female: Very similar to male in size and wing development. Supra-anal plate roundly notched at apex (fig. 57). Subgenital plate with meso-distal margins black, thickened, shallowly convex dorsally and bearing short, stout spines (figs. 65, MC, 71). More slender setae forming setal comb in anal chamber (fig. 65, AC) not contiguous and their separated bases clearly indicated by large, round, dark pigmentation (fig. 71). Curved dorsolateral corners of the plate each armed with a patch of multiple rowed small, slender, setae, these also delineated by dark round bases (fig. 65, LS).

Allotype measurements (mm; measured as alcoholic specimen, prior to being pinned): Total length (including folded tegmina) 14.0; pronotum length 2.7, width 3.4; tegmen length 11.2, width 3.0; abdomen length 6.3.

Coloration ( $\delta$  and  $\eta$ ): Similar (general color buckthorn brown) to *A. platystylata* (Hebard) and *A. conspersa* (Brunner) except for the absence of a broad medio-longitudinal blackish band on the ventral surface of the abdomen (figs. 46, 48). The pronotal markings of *A. nidicteridicola* (fig. 49) are similar to, but much more intense than *A. platystylata* (fig. 51). The pronotal markings of *A. conspersa* (fig. 50) are even lighter than those of *A. platystylata*. (The markings shown in figs. 49-51 are much darker than they actually are because of the use of high contrast film; cf. figs. 45, 83, 89).

A habitus of the nymph of *A. nidicteridicola* is shown in fig. 44, and the oötheca in fig. 101.

Holotype male and allotype female: Near Serra Tamendaui, Rio Negro, Amazonas, Brazil (64° 45' W 0° 27' S). Coll. L. M. Roth, Academy of Natural Sciences, Philadelphia. Reared paratype adults, and nymphs distributed as follows: 2  $\delta$ , 3  $\eta$ , 1 nymph in the Academy

Table 1. Differences between females of 3 species of *Amazonina*.

Characters <sup>a</sup>	<i>nidictericicola</i>	<i>platystylata</i>	<i>conspersa</i>
Supra-anal plate (posterior margin)	broadly rounded, apex indented (fig. 57)	broadly rounded, apex indented (fig. 59)	subtrigonal, with median invagination (fig. 61)
Subgenital plate (posterior margin)	mesodistal border rounded; slightly thickened convex elevations produced dorsad, bearing minute stout comb- like contiguous spines; setae forming comb in anal chamber few in number, not contiguous, each spine delineated by dark round spots. Dorsolateral mar- gins of plate with multiple rows of small non-contiguous setae. (figs. 65, 71).	mesodistal border truncate, lateral corners produced dorsad in small truncate plates, apex armed with con- tiguous spines; setal comb in anal chamber with fewer contiguous spines on truncate apex of an elongate sclerotized bar. Dorsolateral margins of plate armed with single row of fine setae. (figs. 67, 72).	mesodistal border truncate, lateral corners produced in slightly raised truncate plates bearing contiguous spines apically; setal comb of anal chamber with few spines on a sclerotization approxi- mately the combined width of spines. Dorsolateral margin of plate as in <i>platystylata</i> (figs. 69, 73)
Paired spermathecae	Transparent, each incompletely divided by a constriction (fig. 62)	Lightly pigmented, each incompletely divided by a constriction (fig. 63)	Opaque, black, without constrictions (fig. 64)

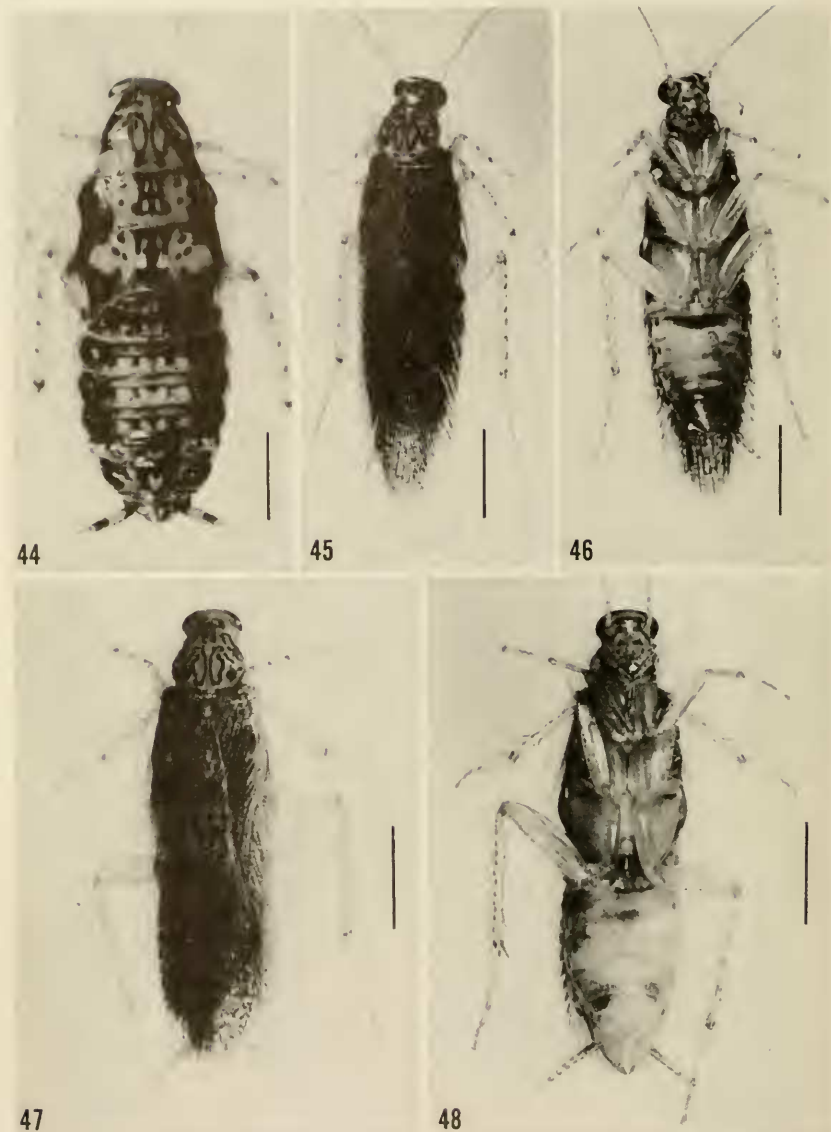
<sup>a</sup> As seen in KOH treated, flattened preparations.

Table 2. Differences between males of 3 species of *Amazonina*.

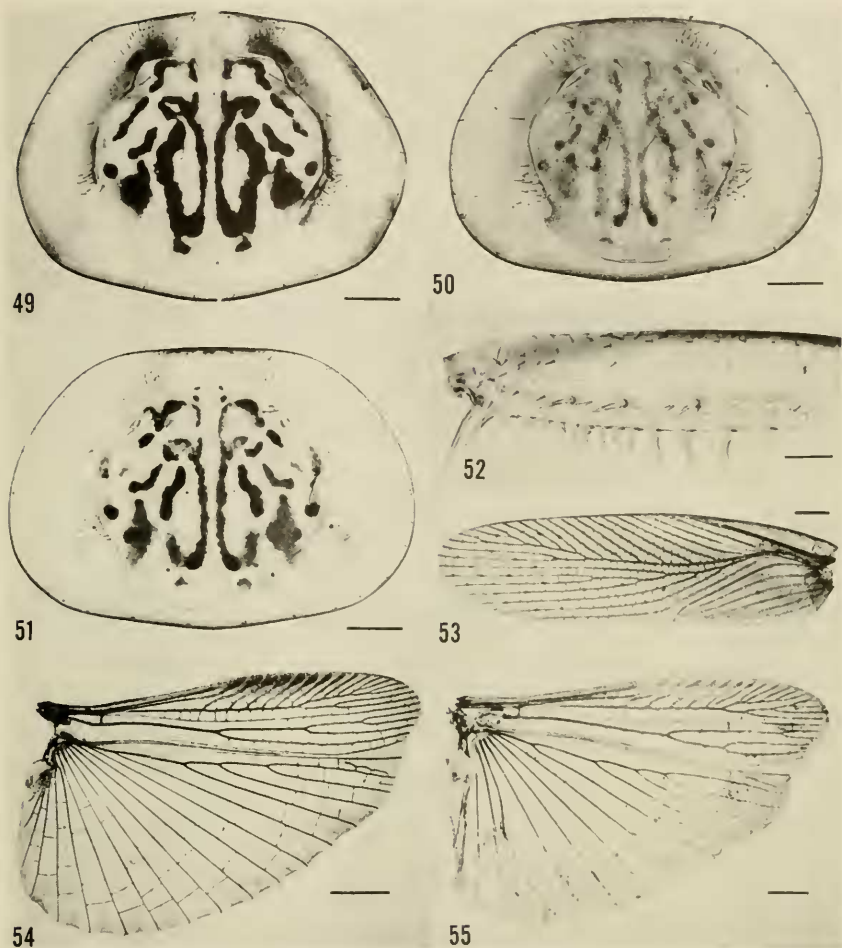
Characters <sup>a</sup>	<i>niditetridicola</i>	<i>platystylata</i>	<i>conspersa</i>
Supra-anal plate (posterior margin)	shallowly convex (fig. 56)	Subtrigonal, apex rounded (fig. 58)	Subtrigonal, apex rounded, sides slightly concave (fig. 60)
Subgenital plate (posterior margin between styles)	lateral corners broadly rounded, armed with short spines; small pointed mesad nipplelike protuberance (fig. 66)	mesad protuberance broad, the apex truncate (ventral aspect) sometimes V- emarginate (caudal aspect); mesolaterally shallowly concave, followed by broad, transverse margins <sup>b</sup> bearing many minute stout spines (fig. 68)	distinct mesad invagination, lateral corners with patch of small heavy spines located apically on narrow protuberances (fig. 70)
L2d (at apex of L2vm)	with marked curvature, surface scalelike (fig. 80)	1 margin subapically swollen, surface scalelike (fig. 77)	gradually tapering without swelling, surface smooth (fig. 74)
R2	Fig. 81	Fig. 78	Fig. 75
L1	Fig. 82	Fig. 79	Fig. 76

<sup>a</sup> as seen in KOH treated, cleared, flattened preparations.

<sup>b</sup> Hiehard (1921) mistakenly considered these structures to be the styles which are actually located on the outer corners of the subgenital plate (fig. 68,S); when folded the styles are hidden and not seen ventrally.



Figs. 44-48. *Amazonina nidictericicola*. 44. Nymph. 45-46. Adult (♂). 47-48. Adult (♀). (scale, fig. 44 = 2 mm, figs. 45-48 = 3 mm).

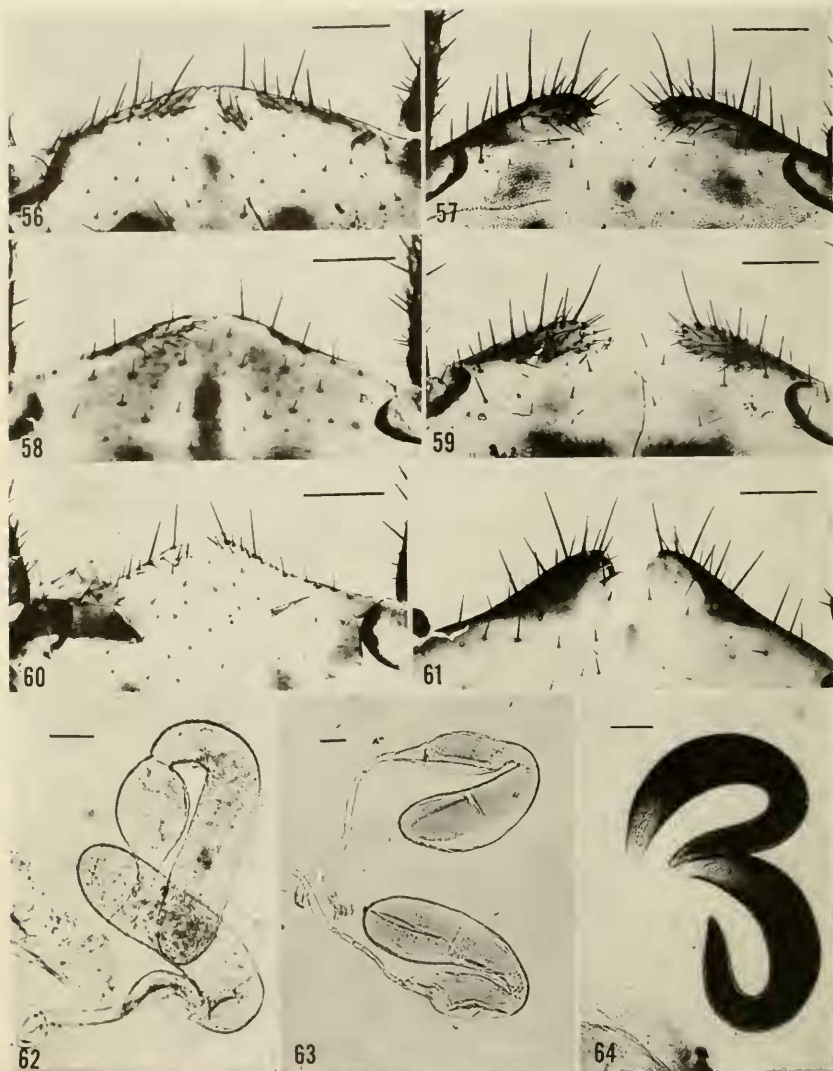


Figs. 49-55. *Amazonina* spp. 49. *A. nidicteridicola*, pronotum (♂). 50. *A. conspersa*, pronotum (♀). 51. *A. platystylata*, pronotum (♂). 52-54. *A. nidicteridicola*. 52. Prothoracic femur (♂; ventrocephalic margin). 53. Left tegmen (♀). 54. Right wing (♀). 55. *A. conspersa*, right wing (♀). (figs. 49-52 from KOH, cleared, flattened preparations; scale, figs. 49-51 = 0.5 mm, fig. 52 = 0.25 mm, figs. 53-55 = 1 mm).

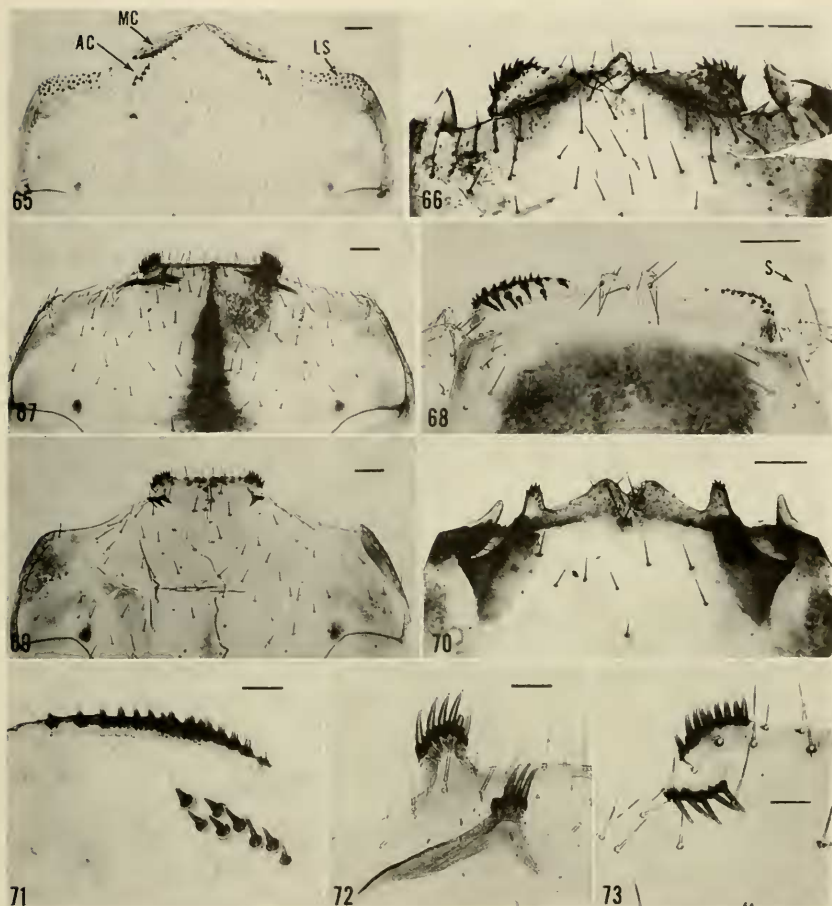
of Natural Sciences, Philadelphia; 3 ♂, 2 ♀, 1 nymph, U. S. National Museum, Washington, D. C.; 1 ♂, 1 ♀, 1 nymph Zoological Institute, Lund, Sweden; 1 ♂, 1 ♀ British Museum (Natural History).

The collection data for *A. nidicteridicola* is as follows: 2 nests collected near Serra Tamendaui, Rio Negro, July 18 and 19, 1967. Nest No. 1, 2 ♀ (1 carrying oötheca), 4 nymphs, and 2 empty oöthecae.





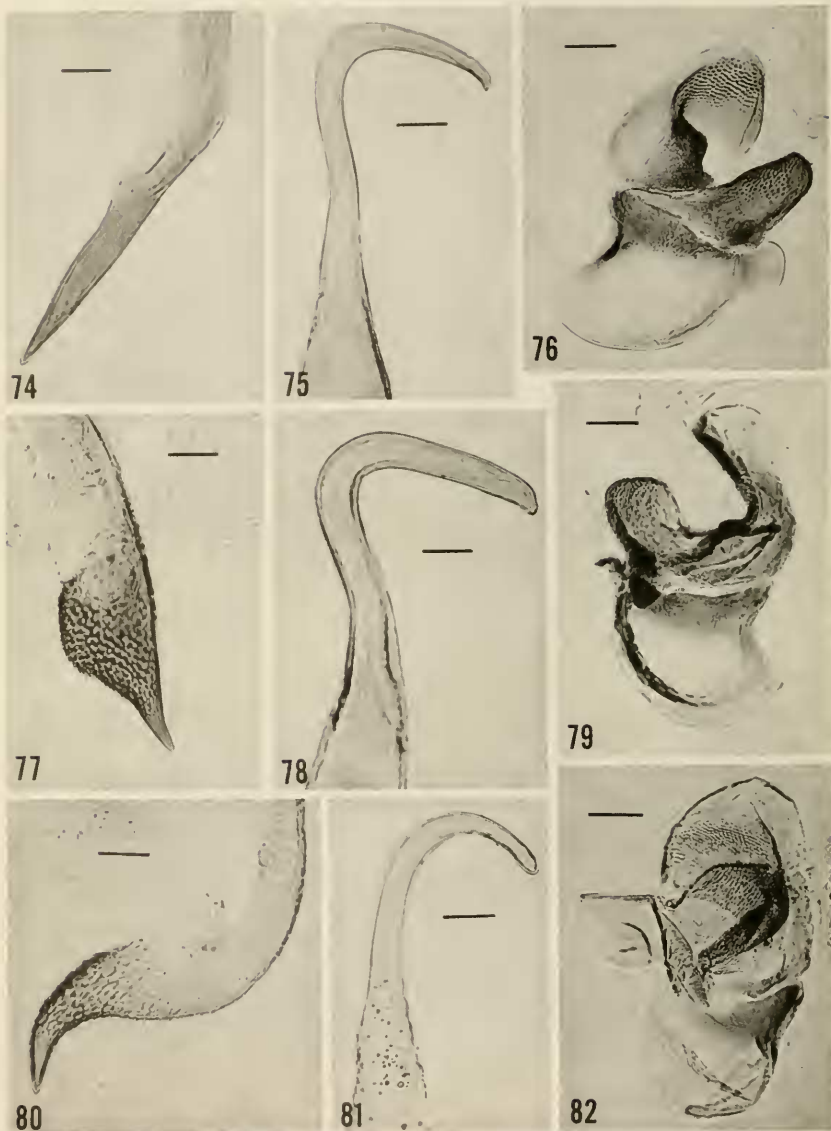
Figs. 56-64. *Amazonina* spp. 56-61. Male (left) and female (right) supranal plates. 56-57. *A. nidicteridicola*. 58-59. *A. platystylata*. 60-61. *A. conspersa*. 62-64. Spermathecae. 62. *A. nidicteridicola*. 63. *A. platystylata*. 64. *A. conspersa*. (KOH, cleared, flattened preparations; scale, figs. 56-61 = 0.25 mm, figs. 62-64 = 0.1 mm).



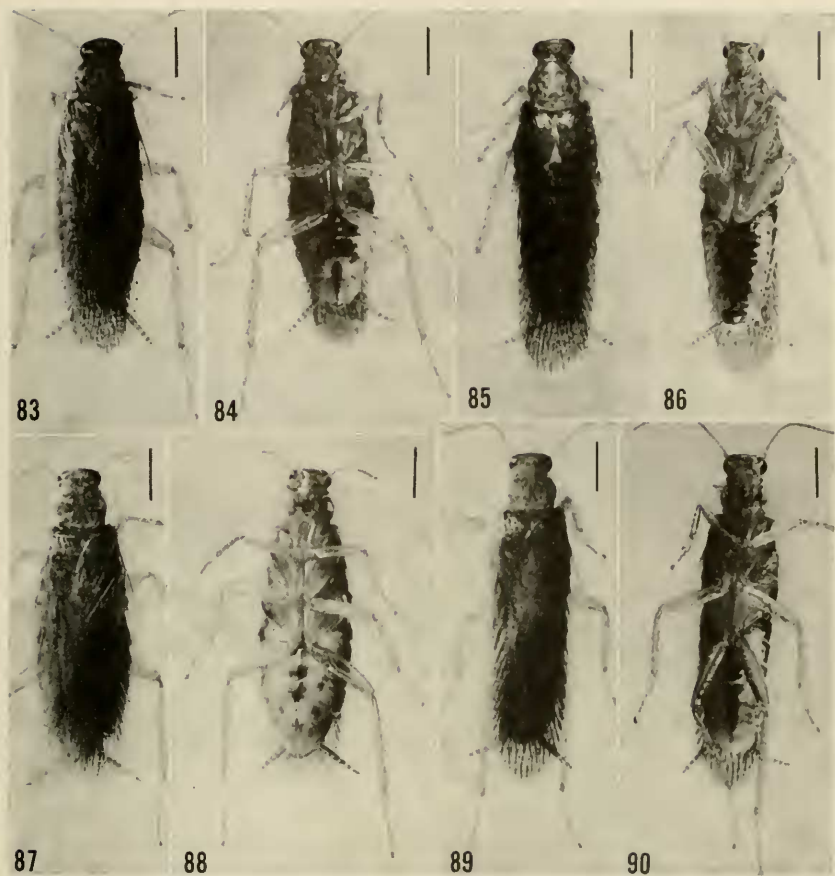
Figs. 65-73. *Amazonina* spp. Subgenital plates (female, dorsal, left; male ventral, right). 65-66. *A. nidicteridicola*. AC = setal comb in anal chamber; MC = marginal comb; LS = lateral group of setae. 67-68. *A. platystylata*. S = style. 69-70. *A. conspersa*. 71-73. Setal combs on female subgenital plates (dorsal). 71. *A. nidicteridicola*. 72. *A. platystylata*. 73. *A. conspersa*. (KOH, cleared, flattened preparations; scale, figs. 65-70 = 0.25 mm, figs. 71-73 = 0.1 mm).

The other nest had 4 ♂, 2 ♀ (1 carrying oötheca), 18 nymphs, and 2 empty oöthecae (1 of these had been parasitized, as evidenced by a round exit hole). *Alphelixia sicca* was also found in these same nests and an adult female of *Lophoblatta arlei* was also taken in nest number 1. One adult *A. nidicteridicola* (reared) was also taken in a nest at Gaviaõ, Rio Negro (near base camp), July 20, 1967.

The numbers of *A. nidicteridicola* taken in these nests, including the



Figs. 74-82. *Amazonina* spp. Parts of male genitalia. L2d and apex of L2vm (left), R2 (middle), L1 (right). 74-76. *A. conspersa*. 77-79. *A. platystylata*. 80-82. *A. nidicteridicola*. (KOH preparations; scale, figs. 74-75, 77-78, 80-81 = 0.05 mm, figs. 76, 79, 82 = 0.1 mm).

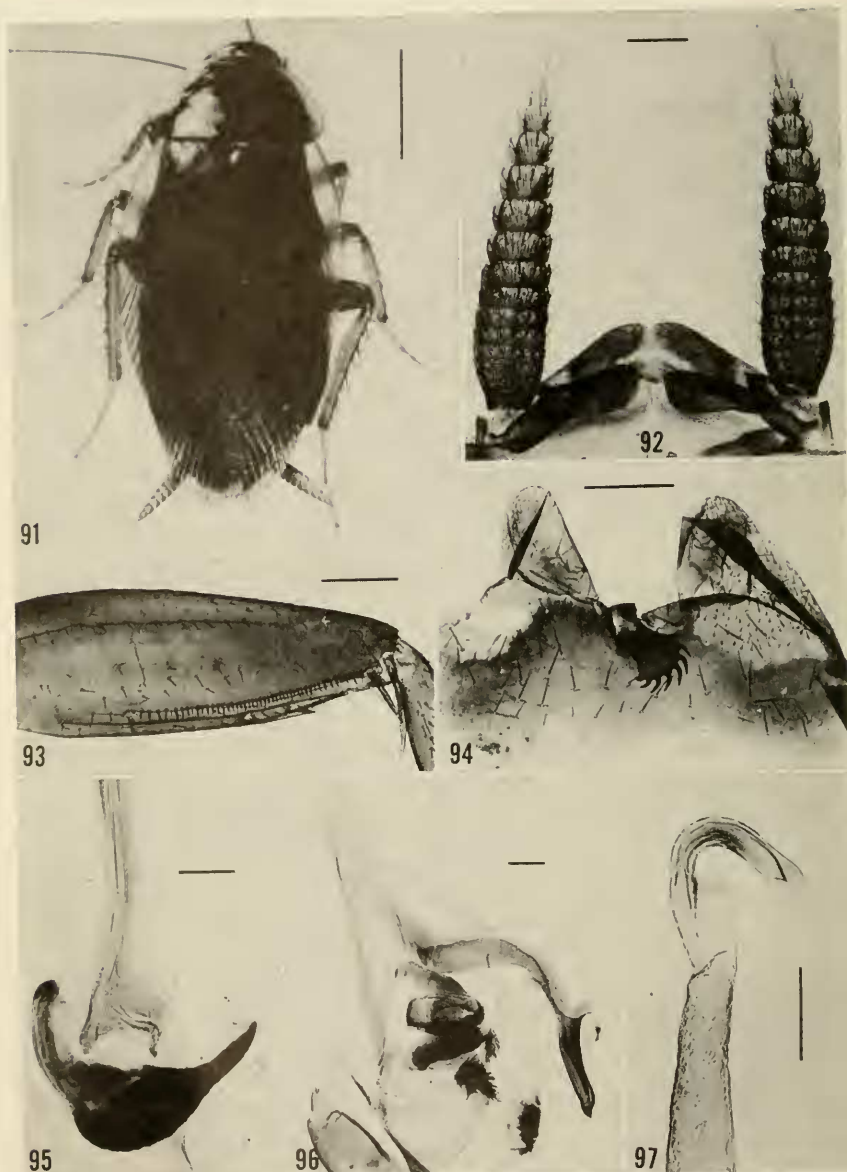


Figs. 83-90. *Amazonina* spp. Adults (dorsal and ventral). 83-86. *A. platystylata*. 83-84. Female. 85-86. Male. 87-90. *A. conspersa*. 87-88. Female. 89-90. Male. (scale = 2 mm).

presence of oöthecae, indicate that the nest habitat is undoubtedly normal for the species.

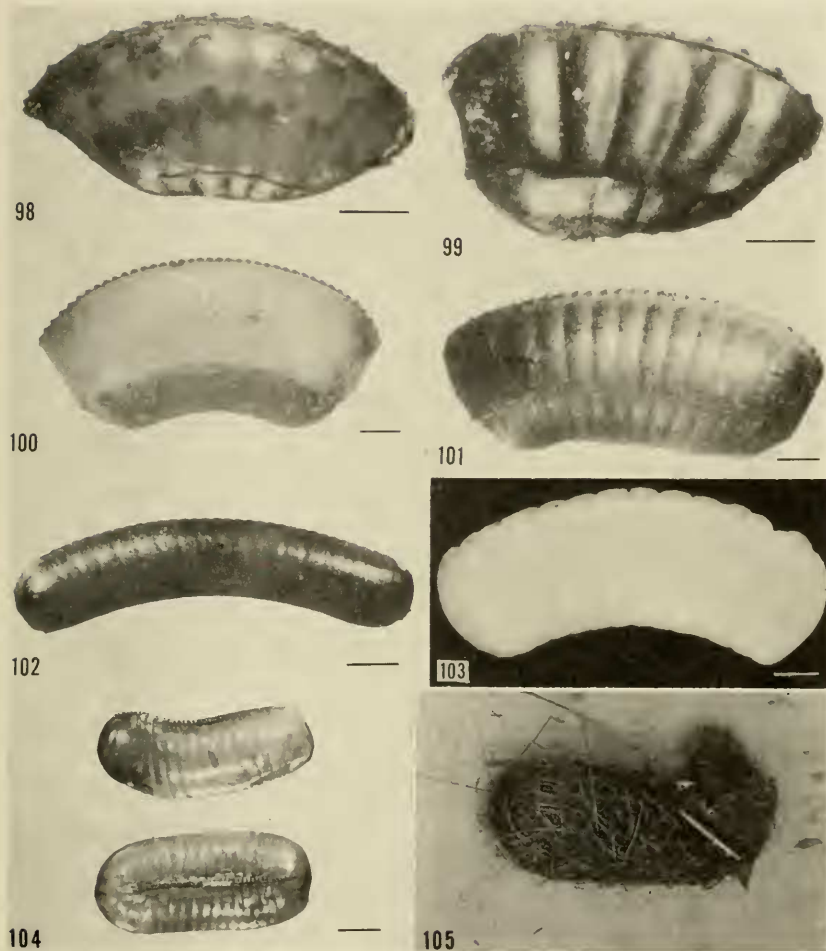
The chromosomes of *A. nidicteridicola* number 25 (♂) and 26 (♀), and are metacentric and submetacentric (reported as *Amazonina* n. sp. (38B), Table 1 and fig. 24 in Cohen and Roth, 1970).

The females of *A. platystylata* and *A. conspersa* are difficult to differentiate (Hebard, 1921). Distinguishing characters for females and males of these 2 species and *A. nidicteridicola* are given in Tables 1 and 2. There is some inter- and intraspecific variation in the number of main branches of the cubitus of the hind wing. In *A. nidicteridicola* there are 3 (fig. 54) or 4; *A. platystylata* has 3



Figs. 91-97. *Dendroblatta cnephaia*. 91. Adult (♀). 92. Supra-anal plate (♂, ventral). 93. Front femur (♂, ventrocephalic margin). 94. Subgenital plate (♂, dorsal). 95-97. Male genitalia. 95. L2vm and L2d. 96. R1. 97. R2. (figs. 92-97 KOH, cleared, flattened preparations; scale, fig. 91 = 4 mm, figs. 92-94 = 0.5 mm, figs. 95-97 = 0.2 mm).





Figs. 98-105. 98-104. Oöthecae of cockroaches found in bird nests. 98. *Chorisoneura* sp. B. 99. *Chorisoneura* sp. A. 100. *Dendroblatta cnephaia*. 101. *Amazonina nidictericidicola*. 102. *Cahita* or *Galibia* (probably *Galibia*). 103. *Schultesia lampyridiformis* (this species is ovoviviparous and the oötheca is carried internally until the eggs hatch). 104. *Lophoblatta arlei* (top, lateral view; bottom, dorsal view). (scale, figs. 98-99, 101 = 0.5 mm, figs. 100, 102-104 = 1 mm). (Figs. 98-102, from Roth, 1971; *Amazonina nidictericidicola* was reported as *Amazonina* sp. (78B) in Figs. 42 and 100). 105. Typical bird nest in which cockroaches were found.

(sometimes 4), and *A. conspersa* has 1, 2 (fig. 55), or sometimes 3 branches. An examination of the wings of several specimens of *platystylata* and *conspersa* showed that the number of cubital branches could differ by one on the right and left wings of the same specimen.

Collection data (none from bird nests) for *A. platystylata* and *A. conspersa* taken on the Alpha Helix 1967 expedition follow:

*A. platystylata*: Tapurucuara, July 12 (♀); Adolpho Ducke Preserve, July 4 (♀, reared); July 24 (♂; also nymphs taken under leaf litter along shallow ditch of clay road); Flores, Manaus, July 25 (♀, 2 ♂ reared from nymphs taken under leaf litter in sandy soil); Egler Preserve, near Manaus, July 30 (♀); Puraquequara, Rio Negro, July 31 (2 ♂, reared); Borba, Rio Madeira, Aug. 4 (2 ♂, reared from nymphs collected under wood chips); Serra Tamendaui, Rio Negro, July 16 (♂ and ♀, reared from nymphs taken in sandy soil).

*A. conspersa*: Gavião, Rio Negro, July 18 (♂ and ♀, sweeping tall weeds); Urucurutuba, Rio Madeira, Aug. 9 (♀ reared from nymph collected under cut palm fronds); Moura, Rio Negro, July 21 (♀).

One bird's nest was collected about 10 miles east of Manaus along the Rio Amazonas, Aug. 12, 1967. A few cockroaches belonging to 3 genera (det. Gurney) were found: either *Cahita* or *Galibia* (probably *Galibia*) (2 ♀, reared); atypical "*Eudromiella*" (♂, reared); and *Chorisoneura* sp. A. (♂ and ♀, reared). The oötheca of *Cahita-Galibia* has an unusual sausagelike shape (fig. 102).

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